Unit 3

Expressions

Exponents
Order of Operations
Evaluating Algebraic Expressions
Translating Words to Math
Identifying Parts of Expressions
Evaluating Formulas
Algebraic Properties
Simplifying Expressions
Identifying Equivalent Expressions

Name: ______________________________

Math Teacher: ______________________________

Unit 3 Pacing

Week of 11/29:
Exponents, Order of Operations and Evaluating Expressions, **COMPUTER LAB DAY**

Week of 12/6:
Evaluating Expressions, Translating Expressions, Properties, **QUIZ**

Week of 12/13:
COMPUTER LAB DAY, Combining Like Terms, Distributive Property, **QUIZ**

Week of 12/20 thru the Week of 12/27:
No School – Winter Break

Week of 1/3 (No School on 1/3 or 1/4):
Review and **TEST**

IXL Login (https://www.ixl.com/signin/ecms)

USERNAME (student ID@ecms): ______________________________

PASSWORD (student ID): ______________________________

Other Login Information

SITE: ______________________________

USERNAME: ______________________________

PASSWORD: ______________________________

Unit 3: Expressions
Standards, Checklist and Concept Map

Georgia Standards of Excellence (GSE):

MGSE6.EE.1: Write and evaluate numerical expressions involving whole-number exponents.

MGSE6.EE.2: Write, read, and evaluate expressions in which letters stand for numbers.

MGSE6.EE.2a: Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as 5-y.*

MGSE6.EE.2b : Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *For example, describe the expression 2(8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.*

MGSE6.EE.2c : Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = \frac{1}{2}$.*

MGSE6.EE.3 : Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3(2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6(4x + 3y); apply the properties of operations to y + y + y to produce the equivalent expression 3y.*

MGSE6.EE.4 : Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*

What Will I Need to Learn??

________ I can evaluate expressions, including with variables and exponents
________ I can translate words to expressions
________ I can identify parts of expressions
________ I can substitute to evaluate formulas
________ I can apply the Order of Operations
________ I can use the distributive property
________ I can identify equivalent expressions

Unit 3 Circle Map: Make a Circle Map of important vocab and topics from the standards listed above.

Unit 3 IXL Tracking Log

Required Skills	
Skill	**Your Score**
D.1 (Write Multiplication Expressions Using Exponents)	
D.2 (Evaluate Exponents)	
D.5 (Exponents with Decimal Bases)	
D.6 (Exponents with Fractional Bases)	
O.3 (Evaluate Numerical Expressions Involving Whole Numbers)	
O.4 (Evaluate Numerical Expressions Involving Whole Numbers)	
O.5 (Identify Mistakes Involving the Order of Operations)	
O.8 (Evaluate Numerical Expression Involving Decimals)	
O.11 (Evaluate Numerical Expressions Involving Fractions)	
Y.1 (Write Variable Expressions – One Operation)	
Y.2 (Write Variable Expressions – Two Operation)	
Y.3 (Write Variable Expressions – Word Problems)	
Y.4 (Evaluate Variable Expressions with Whole Numbers)	
Y.5 (Evaluate Multi-Variable Expressions)	
Y.6 (Evaluate Variable Expressions w/ Decimals, Fractions & Mixed Numbers)	
Y.8 (Identify Terms & Coefficients)	
Y.9 (Sort Factors of Variable Expressions)	
Y.11 (Properties of Addition)	
Y.12 (Properties of Multiplication)	
Y.14 (Multiply Using the Distributive Property)	
Y.15 (Factor Using the Distributive Property)	
Y.17 (Write Equivalent Expressions Using Properties)	
Y.18 (Add and Subtract Like Terms)	
Y.19 (Identify Equivalent Expressions I)	
Y.20 (Identify Equivalent Expressions II)	

Unit 3 - Vocabulary

Term	Definition
Algebraic expression	A group of variable(s), operation(s), and/or number(s) that represents a quantity. Expressions do not contain equal signs.
Coefficient	A number which multiplies a variable
Constant	A quantity that has a fixed value that doesn't change, such as a number.
Exponent	Shows how many times to multiply the base number by itself
Like terms	Terms whose variables (and exponents) are the same
Order of operations	A specific order in which operations must be performed in order to get the correct solution to a problem
Term	One part of an algebraic expression that may be a number, a variable, or a product of both
Variable	A symbol, usually a letter, that represents a number
Associative property of addition	This property states that no matter how numbers are grouped, their sum will always be the same
Associative property of multiplication	This property states that no matter how numbers are grouped, their product will always be the same
Commutative property of addition	This property states that numbers may be added together in any order, and the sum will always be the same
Commutative property of multiplication	This property states that numbers may be multiplied together in any order, and the product will always be the same
Distributive property	Multiplying a number is the same as multiplying its addends by the number, then adding the products

Unit 3 – Vocabulary – You Try

Term	Definition
Algebraic expression	
Coefficient	
Constant	
Exponent	
Like terms	
Order of operations	
Term	
Variable	
Associative property of addition	
Associative property of multiplication	
Commutative property of addition	
Commutative property of multiplication	
Distributive property	

Math 6 – Unit 3: Expressions Review

1) Identify each part of the expression. Write "n/a" if the part is not in the expression: **$9(3x^2 + 4)$**

   a) coefficient: ____________ b) constant: ____________

   c) variable: ______________ d) exponent: ____________

   e) quotient: ______________ f) product: ______________

   g) factors: ________________ h) sum: ________________

   i) difference: _____________

2) What does it mean when a number is squared or cubed? Give an example of each. ______________________________

   ____

   ____

3) Evaluate the expression. Show EACH step. $10^2 – (14 – 2 + 7)$

4) Write using exponents AND solve? 5 • 5 • 5 • 5 =

5) If m=5, evaluate the expression: $4m^2 + 6m$

6) Apply the distributive property to write an equivalent expression to $9(y – 3)$.

7) Combine like terms to simplify this expression:
$8x^3 + 4x^2 + 12x^3 - x^2$

8) The cost of renting a moving truck is $39.99 plus an additional $0.50 for each mile driven. Write an expression to represent the cost of renting the truck for *m* miles.

9) Give an example of each of the properties below:

   a) commutative property: ______________________________

   b) distributive property: ______________________________

   c) associative property: ______________________________

10) Write an expression for the product of 6 and c. ____________

11) Write an expression for 22 less than y. _____________________

12) Which expression is not equivalent to the others?

    a) 3(4 + 2) b) 3(4) x 3(2) c) 3(4) + 3(2) d) 12 + 6

13) The formula A=lw can be used to find the area of a rectangle. Ms. Julien is mowing a rectangular lawn that is 9.5 yards long and 6 yards wide. What is the area of the lawn?

14) The formula for surface area of a cube is SA = $6s^2$. Find the surface area of a cube whose side length (s) is 12 cm.

15) The expression $12n + 75$ can be used to find the total price for n students to take a field trip to the science museum. Evaluate the expression $12n + 75$ if there are 25 students attending the field trip. ($n = 25$).

16) Write a phrase for the expression $\frac{n}{7}$. ____________________

17) Which expression represents the phrase, "eight less than the product of six and b?

a) $8 - 6b$ b) $6 - b + 8$ c) $6b - 8$ d) $6b \times 8$

18) Evaluate 10 squared. ______________________________

19) When you combine like terms, you mu8st look for terms with the same variable AND exponent. Choose the expression that is equivalent to $4m + 4m^2 - m + 6m^2 + 2m^2$

a) $15m^2$ b) $17m^2$ c) $12m^2 + 3m$ d) $10m^2 - 3m$

20) Silly Sally has a friend named Cuckoo for Cocoapuffs. He also does not understand how to apply the order of operations, and has made a mistake in the problem below. Find the mistake and explain in THREE COMPLETE SENTENCES what the mistake is and what should have been done. Then write what the correct answer really is.

$125 - 15 \bullet 2^3 + 5$

$125 - 15 \bullet 6 + 5$

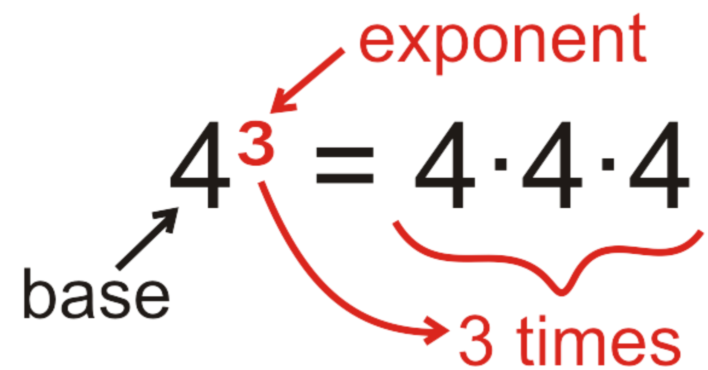
$125 - 90 + 5$

$35 \quad 5$

40

Exponents

An exponent tells how many times to multiply a base times itself.



You read 4^3 as 4 to the 3rd power or 4 cubed or 4 to the third power.

You read 5^2 as 5 squared or 5 to the second power.

If a base is being raised to the zero power, it will always be equal to one.

When evaluating an exponent REMEMBER, an exponent only works on what it touches!

Example:

$2 + 3^3 = 2 + 9 = 11$ $(2 + 3)^3 = 5^3 = 125$

You Try:

Evaluate:

1) 2^4 2) $5 + 7^2$ 3) $(5 + 7)^2$

4) $10 - 3^2$ 5) $(10 - 3)^2$ 6) $2 - 2^0$

You can write numbers in many different forms.

Example:

Exponential Form	Expanded Form	Value
2^5	2 • 2 • 2 • 2 • 2	32
Y^4	y • y • y • y	Depends on value of y
9^2	9 • 9	81
10^0		1
3^6	3 • 3 • 3 • 3 • 3 • 3	729

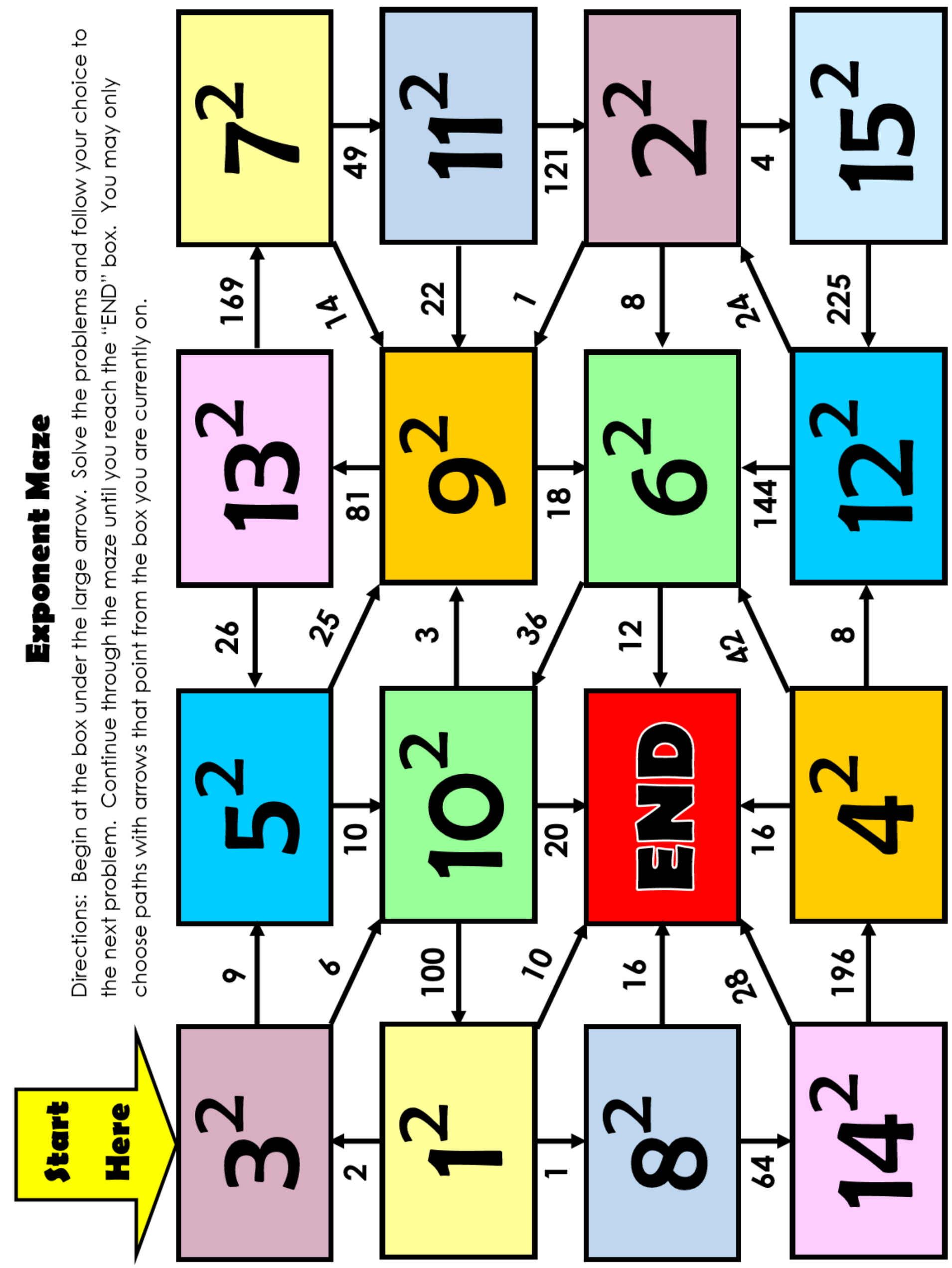
You Try:

Fill in the blanks below to complete the chart.

Exponential Form	Expanded Form	Value
6^3		
	10 • 10 • 10	
4^2		
	x • x • x • x • x • x	
90^2		

Exponent Maze

Directions: Begin at the box under the large arrow. Solve the problems and follow your choice to the next problem. Continue through the maze until you reach the "END" box. You may only choose paths with arrows that point from the box you are currently on.



Order of Operations

When computing a problem that has more than one operation, the "Order of Operations" lists the order in which to work the problem to ensure that no matter who solves the problem, the answer will always be the same. Having this set of rules prevents us from getting multiple answers to the same problem!

MULTIPLICATION and **DIVISION** are a group and they are worked from left to right.

ADDITION and **SUBTRACTION** are a group and they are worked from left to right.

When solving problems using the Order of Operations, your problems will look like a triangle (or a Dorito!) You must show all of your work as you complete each step!

Examples:

$8 + 14 \div 7 \times 3 - 5$	$6 - (5-3) + 10$	$42 - (8 - 6) \times 2^2$
$8 + 2 \times 3 - 5$	$6 - 2 + 10$	$42 - 2 \times 2^2$
$8 + 6 - 5$	$4 + 10$	$42 - 2 \times 4$
$14 - 5$	14	$42 - 8$
9		34

You Try:

1) $2 \bullet 2 + 3^2$

2) $3 + (6 - 5)^3$

3) $(2 + 4)^2 \div 2$

4) $42 \div (3^2 - 3)$

5) $23 \bullet (3 + 4) \div 2$

6) $2 + 4^2 - (3 + 2)$

7) $4^2 \div 8$

8) $(3 - 1) + 6 \times 3$

9) $90 \div 9 - 5 + 8$

Expressions

An expression is a mathematical statement that contains numbers and operations.

An algebraic expression is an expression that contains at least one *variable*, along with operations and/or numbers.

Expressions	Algebraic Expressions	Non-Examples of Expressions
48 ÷ 12	48 ÷ *y*	*y* (this is a variable)
5^2	x^2	25 (this is a constant)
13 + 9	13 + *t* • 3	+ (this is an operation)

Parts of Expressions

$$2x^3 + 4x - 7$$

coefficients: 2 and 4
variable: x
quotient: none
factors: 2, x, and 4
difference: 4x – 7

constant: 7
exponent: 3
product: 2x3 and 4x
sum: $2x^3 + 4x$
terms: $2x^3$, 4x, 7

Example:

5x + 14 — This example has two terms, 5x and 14
5x is the product of 5 and x

2(8 + 7) — This example has three constants (2, 8 and 7)
There is a product (2 • (8 + 7))
There is a sum (8 + 7)
There are two factors (2 and 8+7)

You Try:

Use the expression below to identify the parts.

$$7y^2 + \frac{4x}{5} - 3$$

a) coefficient: ____________ b) constant: ____________
c) variable: ____________ d) exponent: ____________
e) quotient: ____________ f) product: ____________
g) factors: ____________ h) sum: ____________
i) difference: ____________

Evaluating Expressions

To evaluate, or *solve* an algebraic expression, you **substitute** a number in place of the variable(s) and then find the value.

Note: When a number and letter are written side by side with no operation indicated, then it can be assumed you will multiply them together.

3*x* = 3 times whatever *x* is. 4*p* = 4 times whatever *p* is

6*u* + 4 = the sum of the product of 6 and whatever *u* is and 4

Examples:

Evaluate the following algebraic expressions when *a* = 10, *b* = 3, and *c* = 5.

b + 18 (given expression)	4*a* ÷ c (given expression)	b^2 (given expression)
3 + 18 (substitute 3 in for *b*)	4 • 10 ÷ 5 (substitute)	3^2 (substitute)
21 (solution)	40 ÷ 5 = 8 (solution)	9 (solution)

You Try:

Substitute to evaluate the following algebraic expressions when $x = 2$, $y = 25$ and $z = 8$. Show all of your work!

1) $3z$	2) $y - z + x$	3) y^x
4) $z \div x$	5) $x + y + z$	6) $9 - x$
7) $100 - 10x - 10z$	8) $14 \div x + 2y$	9) w^0
10) xyz	11) $z(x + y)$	12) $x + x \bullet y$

Evaluating Expressions Extra Practice

Use substitution to evaluate each expression for the given value of the variable. Show your work!

1) $9y - 3$ (for y = 11)	2) $7m$ (for m = 5)	3) $d^2 - 2d$ (for d = 9)
4) $6q + 39$ (for q=10)	5) $6v$ (for v = 3)	6) $j^3 + 11$ (for j = 8)
7) $2k^2 + 5k + 2$ (for k = 11)	8) $\frac{n}{3} + n$ (for n = 27)	9) $a \div 3$ (for a = 42)
10) $4(11 + p) + 13$ (for p = 89)	11) $h^3 - 2$ (for h = 7)	12) $14z - 1$ (for z = 9)

Evaluating Expressions Extra Practice

Use substitution to evaluate each expression for the given value of the variable. Show your work!

13) $15e + 37$ (for e = 5)	14) $19r$ (for r = 8)	15) $x^2 + 2x + 4 + x$ (for x = 10)
16) $7(4 + h)$ (for h=21)	17) $13 + w$ (for w = 26)	18) $b - 15$ (for b = 15)
19) $\frac{y}{12} + y$ (for y = 72)	20) $3b^2 + 5b$ (for b = 2)	21) $8e + 22$ (for e = 42)
22) $2x^2 - 11x + 6$ (for x = 12)	23) $p^3 - 4p$ (for p = 4)	24) $16(3 + a) - a$ (for a = 13)

Using and Evaluating Formulas

A formula is a mathematical rule written using variables, usually an expression or equation describing a relationship between quantities.

To ***evaluate*** or ***solve*** a formula, you substitute the number for the variable.

Common Formulas

Area of a rectangle = l • w

Area of a triangle = $\frac{1}{2}bh$

Area of a Trapezoid = $h(\frac{b_1+b_2}{2})$

Surface Area of a Cube = $6s^2$

Volume of a Cube = s^3

<u>**Example 1**</u>: Mary Lou is setting up a lemonade stand. Her rectangular sign is 3 feet long and 2.5 feet wide. If the formula for area of a rectangle is A = l • w, what is the area of her sign?

A = l • w → *Step 1: Write the formula.*
A = 3 ft • 2.5 ft → *Step 2: Substitute for the variable(s).*
A = 7.5 ft^2 → *Step 3: Solve (in this case, multiply).*

<u>**Example 2:**</u> Billy Bob needs to figure out the volume of a cube. It is 12 in tall. Help him find the volume, if the formula is V = s^3.

V = s^3 → *Step 1: Write the formula.*
V = 12 in • 12 in • 12 in → *Step 2: Substitute for the variable(s).*
V = 144 • 12 → *Step 3: Solve (in this case, multiply).*
V = 1728 in^3

<u>**You Try:**</u>

1) What is the surface area of a cube that is 4 in. tall?
2) What is the area of a rectangle with a height of 8.5 cm and a width of 3 cm?
3) What is the area of a triangle with a height of 5m and a base length of 9m?
4) What is the area of a trapezoid that is 4cm high, with bases that are 10cm and 12cm long?
5) Why are formulas useful/helpful?

Words and Phrases to Math Symbols

Words can be translated into math symbols to form expressions and equations. Here is a list of key words to look for.

Addition

Plus
And
Total of
Altogether Increased By
Combined Add Sum
Together More Than
Added To
In All
Make

Subtraction

Subtract Gave Take Away
Decrease By Fewer Minus
Shared Fewer Than Less Than
Difference Less

Multiplication

Times Triple
Double Product
Multiplied By
OF
Increased By a Factor
Twice Multiple

Division

Quotient of Per Ratio of
Divided By Half Divisor
Divided Into Percent Split Up

Equals

Is Are Were Was

Will Be Yields Sold For

Parenthesis Words

The Quantity of
Twice the sum of
Times the sum of
Times the difference of
Plus the difference of

Writing Algebraic Expressions

Translating words into math symbols or math symbols into words can be done in many ways. Here are just a few examples.

Operation	Verbal Expressions	Algebraic Expressions
+	- add 3 to a number - a number plus three - the sum of a number and 3 - 3 more than a number - a number increased by 3	n + 3
-	- subtract 12 from a number - a number minus 12 - the difference of a number and 12 - 12 less than a number - a number decreased by 12 - take away 12 from a number - a number less 12	x – 12
X	-2 times a number -2 multiplied by a number -the product of 2 and a number	2m or 2 · m
÷	- 6 divided into a number - a number divided by 6 - the quotient of a number and 6	a ÷ 6

Example:

Translate the words into math symbols.

1) add 43 to a number, *n*
   43 + *n*

2) a number, *w* decreased by 12.
   w – 12

3) 8 less than a number *y*
   y - 8

You Try:

1. add 43 to a number *n*
2. a number x divided into 25
3. 7 times a number *e*
4. take away a number *c* from 16
5. difference of a number *q* and 24
6. product of a number *r* and 41
7. 13 more than a number *j*
8. a number *a* less 49
9. a number *v* decreased by 28
10. a number *b* multiplied by 46
11. 30 minus a number *h*
12. a number *u* divided by 36
13. quotient of 23 and a number *e*
14. 8 less than a number *y*
15. subtract a number *m* from 19
16. 9 more than the twice a number a
17. sum of a number z and 34
18. 3 increased by a number *p*
19. 33 increased by a number *u*
20. add 6 to a number *k*
21. take away a number *f* from 20
22. The difference of 9 and x
23. sum of a number *b* and 35
24. a number *x* times 44
25. a number *w* decreased by 12
26. a number *j* minus 10
27. 32 less a number *t*
28. 48 multiplied by a number *q*
29. 4 divided by a number *s*
30. difference of a number *c* and 2

Commutative & Associative Properties

The **Commutative Property** says that the order in which you **add** or **multiply** two numbers does not change the sum or product. For any numbers *a* and *b*: $a + b = b + c$ **and** $a \times b = b \times a$

*Think commute, (like how you **move** to work) the numbers can move position without changing the outcome.*

The **Associative Property** says that the way you group numbers when you **add** or **multiply** them does not change the sum or product. For any numbers *a*, *b* or *c*: $(a + b) + c = a + (b + c)$ **and** $(ab)c = a(bc)$

Think associate, (like how you associate with your friends) the numbers can "hang out" in different groups and not change the outcome.

Example:

Which property is illustrated by each statement?

1) 13 + 14 = 14 + 13

2) 2 + (3 + 4) = (2 + 3) + 4

You Try:

1) 3 + 4 = 4 + 3

2) 2(9) = 9(2)

3) $xy = yx$

4) $g + h + 2 = g + 2 + h$

5) (2 + 5) + 7 = 2 + (5 + 7)

6) (6 • 5) x = 6 (5 • x)

7) $7 + m = m + 7$

8) 3 (4 • 5) = (4 • 5) 3

Combining Like Terms

Combining Like Terms is like matching your socks. In the same way that we put our socks in matching pairs, we can combine like terms to put terms with the **same variables and exponents** together.

Examples:

1) **2x** and **3x** have the same variable (x) to the same exponent (^{1}), so they can be combined to make 5x.
2) **$5y^2$** and **$4y^2$** have the same variable (y) and the same exponent (^{2}), so they can be combined to make $9y^2$.
3) **8m** and **$3m^2$** are **NOT** like terms because they do have the same variable, but not the same exponent.

Some helpful hints to make combining like terms easier.

1) You can put different shapes around like terms before you combine them to make sure you don't miss any terms. Make sure you put the shape around the sign too!

$$6m + 2p + 3 + 4p - 2m + 4$$

2) You can also highlight like terms before you combine them to make sure you don't miss any terms. Make sure you highlight the sign too!

$$6m + 2p + 3 + 4p - 2m + 4 =$$

$$6m - 2m + 2p + 4p + 3 + 4$$

$$4m + 6p + 7$$

You Try:

1) $5x + x^2 + 8y - 2x + 3x^2 =$

2) $9 + 6k + 3 + 2k^2 + 3 + 7k^2 =$

3) $12x + 3y - 2a + 6y - 5x =$

4) $5 + 6m + 12 - 6m - 17 =$

5) $12h + 3p - 9h + 3 - 3p =$

6) $3x + 2y + x =$

7) $8.2 + 2.1c - 2d + c =$

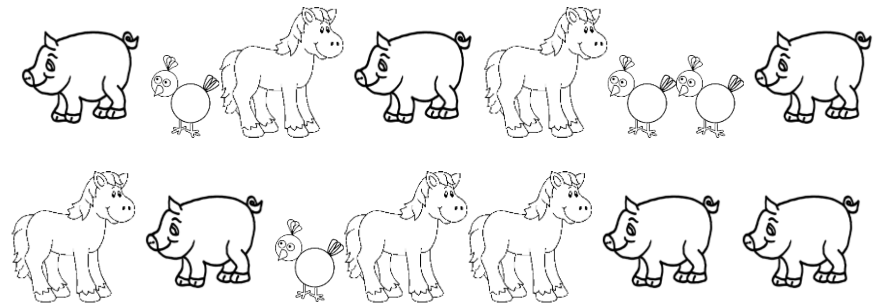
8) $10b^2 + 10b + 10b^2 =$

9) $7a + 3n + 3a^2 =$

10) $3.7m^4 + m^2 + 2.14m^4 =$

11) $\frac{1}{4}d + \frac{2}{3}g + \frac{1}{4}d =$

More Combining Like Terms



Part 1: Look at the pictures of the farm animals below. Determine how many pigs, chickens, and horses there are.

Pigs: ____________________ Horses: ________________________

Chicken: ________________

Part 2: Write an algebraic expression to show how many of each animal are on your paper. Instead of pictures, use variables to represent each animal. **Use p for pig, c for chicken, h for horse.**

____

Part 3: Simplify your algebraic expression by combining like animals.

____

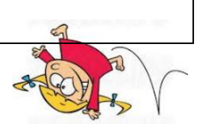
Part 4: What if a horse got lost? How would you represent that in your expression?

____

Combining Like Terms Error Analysis

Sally is a silly little girl who makes mistakes! In Column #1, analyze her work and <u>circle her mistake</u>. In Column #2, explain what she did wrong. In Column #3, show how Silly Sally should work out the problem correctly. Show ALL work!

Silly Sally's Work **(Circle her mistake):**	**What did Silly Sally do wrong?**	**Show Silly Sally how it's done! (Show ALL steps!)**
$6x + 5x + 2y$ $11x + 2y$ $13xy$		
$3a^2 + 4a^2 – a^2$ $7a^2 – a^2$ $8a^2$		
$m + 3m – 4m + 2m$ $4m – 4m + 2m$ $16m + 2m$ $18m$		
$6y^3 + 2y^2 + 4y^3 + 2y^2$ $8y^2 + 4y^3 + 2y^2$ $10y^2 + 4y^3$		
$13x + 5 + 17x – 4.5 + x$ $18x + 17x – 4.5 + x$ $35x – 4.5 + x$ $30.5x + x$ $31.5x$		
$12r^2 + 3 + 8rs + 4r^2 - 16r^2$ $16r^2 + 3 + 8rs – 16r^2$ $24r^2s + 3 – 16r^2$ $8r^2s + 3$		



The Distributive Property

Distributive Property

Words To multiply a sum by a number, multiply each addend by the number outside the parentheses.

Example

Numbers: $2(7 + 4) = 2 \times 7 + 2 \times 4$

Algebra: $a(b + c) = ab + ac$

Think of the factor that is being distributed as the mamma bird. What happens when the mamma doesn't feed her babies? They die! Don't kill off the baby birds, make sure mamma feeds them all!

Example

1. $10 \bullet 23 = 10\ (20 + 3)$

$10 \bullet 20 + 10 \bullet 3$

$200 + 30$

230

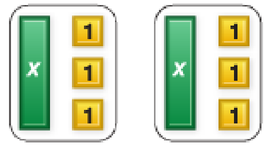
<u>You Try:</u>

1) $12 \bullet 41$ 2) $11 \bullet 45$ 3) $2 \bullet 123$

2. **Use the Distributive Property to rewrite $2(x + 3)$.**

$2(x + 3) = 2(x) + 2(3)$ Distributive Property

$= 2x + 6$ Multiply.



You Try:

1) 8(x + 3)

2) 5(9 + x)

3) 2(x + 3)

3. **Fran is making a pair of earrings and a bracelet for four friends. Each pair of earrings uses 4.5 centimeters of wire and each bracelet uses 13 centimeters. Write two equivalent expressions and then find how much total wire is needed.**

Using the Distributive Property, $4(4.5) + 4(13)$ and $4(4.5 + 13)$ are equivalent expressions.

$4(4.5) + 4(13) = 18 + 52$
$= 70$

$4(4.5 + 13) = 4(17.5)$
$= 70$

So, Fran needs 70 centimeters of wire.

You Try:

Each day, Martin lifts weights for 10 minutes and runs on the treadmill for 25 minutes. Write two equivalent expressions and then find the total minutes that Martin exercises for 7 days.

Class Period: 1 2 3 4 Date:

Problem		(	+/-	)	=		+/-		=	Sum	Product
5(37)	5	(30	+	7)	=	5 • 30	+	5 • 7	=	150 + 35	185
12(13)	12	(10	+	3)	=				=		
100(52)					=				=		
8(17)					=				=		
					=	2 • 90	+	2 • 9	=		
	7	(30	+	5)	=				=		
4(14)					=				=		
					=				=	180 + 30	

The Distributive Property

Solve these problems two ways, use the distributive property and the order of operations.

1) 5(9 + 11)

2) 12 (3 + 2)

Use the distributive property to rewrite the following expressions. Combine like terms if necessary.

3) 5(2 + 8)

4) 10(x + 2)

5) 14(a + b)

6) 12(a + b + c)

7) 7(a + b + c)

8) 10(3 + 2 + 7x)

9) 1(3w + 3x + 2z)

10) 5(5y + 5y)

11) 9(9x + 9y)

12) 2(x + 1)

13) 6(6 + 8)

14) 4(5v + 6v)

15) 3(2 + 6 + 7)

16) 2(3x + 4y + 10x)

17) 5(5x + 4y)

Factoring

Factor an Expression

When numeric or algebraic expressions are written as a product of their factors, the process is called **factoring the expression**.

Example

Tutor

1. Factor 12 + 8.

$12 = 2 \cdot 2 \cdot 3$ Write the prime factorization of 12 and 8.

$8 = 2 \cdot 2 \cdot 2$ Circle the common factors.

The GCF of 12 and 8 is $2 \cdot 2$ or 4.

Write each term as a product of the GCF and its remaining factor. Then use the Distributive Property to *factor out* the GCF.

$12 + 8 = 4(3) + 4(2)$ Rewrite each term using the GCF.

$= 4(3 + 2)$ Distributive Property

So, $12 + 8 = 4(3 + 2)$.

Factoring is the inverse of the distributive property. When you are factoring, you are looking to pull out the common factors that are in the addends. (You have to find the mamma and take her out!)

<u>You Try:</u>

Find the common factor (mamma bird) and factor it out of the expressions below.

1) 9 + 21

2) 14 + 28

3) 80 + 56

(+/-)	=	+/-	=	Final Expression
5 (x + 3)	=	5 • x + 5 • 3	=	5x + 15
7 (y + 5)	=		=	
10 (2b + 20)	=		=	
	=	2 • x + 2 • 9	=	
	=	6 • b - 6 • 7	=	
	=		=	4x – 12
	=		=	2j + 2
8 (2c - 32)	=		=	

(+/-)	=	+/-	=	Final Expression
	=		=	8n – 40
12 (3w - 7)	=		=	
	=	100 • x + 100 • 9	=	
	=		=	15x + 30
	=	9 • z - 9 • 5	=	
	=		=	3x + 33
77 (9v - 15)	=		=	
	=	$\frac{1}{2}$ • x + $\frac{1}{2}$ • 4	=	
.25 (n + 10)	=		=	

Factoring Practice

Factor the expressions.

1) $20g + 45$	2) $40 + 64u$
3) $35d + 21$	4) $48n + 4$
5) $90s + 80$	6) $55r + 44$
7) $99n + 45$	8) $12m + 22$
9) $10c + 8$	10) $45g + 81$
11) $14m + 16$	12) $21y + 9$
13) $35d + 40$	14) $12 + 8p$

Distributive Property Extra Practice

Multiply or Factor the expressions using the Distributive Property.

1) Factor: $25g + 50$	2) Multiply: $7(3x + 2) =$
3) Multiply: $3(21x + 19) =$	4) Factor: $36n + 48$
5) Factor: $49s + 14$	6) Multiply: $6(3x + 7) =$
7) Factor: $5x + 15$	8) Multiply: $7(18m + 25) =$
9) Multiply: $10(c + 40) =$	10) Factor: $64g + 68$
11) Factor: $21m + 300$	12) Multiply: $13(14y + 23) =$
13) Multiply: $7(13d + 2) =$	14) Factor: $120 + 80p$